Remarks/Arguments

Applicants thank Examiner Sandvik again for his careful examination of this application and the clear explanation of the claim rejections. In response to the Office Action of May 22, 2006, applicants amend the claims. Reconsideration of this application, based on the amendments and the following remarks is requested.

Claims 5 through 9 and 12 are now in this case. Claims 5 and 12 are amended in this paper. Claims 1 through 4, 10, 11, and 13 through 32 are canceled from this examination to advance the prosecution of this case.

Claims 5, 6, 8, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lo[1], in view of Egawa[2], further in view of Chow[3] et al. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lo et al.[4], in view of Chow[5]. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lo[6], Egawa[7], Chow[8], in view of Huang[9].

Only claim 5 among the pending claims is independent, which is amended to add the limitation that the contact pads of the semiconductor wafer be free of solder bumps and gold studs. This is supported in the original specification of this application.[10] Also, in the amended claim 5, the element "wafer" is replaced by the term "device units", the term "metal stud" is replaced with "copper stud", the step of "singulating the wafer into individual device units" is add, and the encapsulation step is further limited such that the molding compound covers "the active surface and exposed portion of the opposite surface." Claim 5 is so amended to cover applicants' invention more completely. No new matter is added.

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[1] U.S. Patent Publication No. 2002/0079592 A1, published Jun. 27, 2002 on an application filed Dec. 22, 2000 by Lo et al.
[2] U.S. Patent No. 6,426,554, on an application filed Mar. 6, 2000 by Egawa.
[3] U.S. Patent No. 6,413851, on an application filed June 12, 2001 by Chow et al.
[4] Lo, supra.
[5] Chow, supra.
[6] Lo, supra.
[7] Egawa, supra.
[8] Chow, supra.
[9] U.S. Patent No. 6,384,472, on an application filed Mar. 24, 2000 by Huang.
[10] Specification S.N. 10/826,713, page 3, lines 1 through 3.

Applicants respectfully submit that none of the cited references discloses all the elements in the amended claim 5.

First, all three references teach using bumps of solder material or gold, contrary to the amended claim 5, which requires an assembled semiconductor chip in a flip-chip package that has no solder bumps or gold studs on the chip contact pads:

> The material for the bumps 218 includes tin/lead alloy, gold, conductive polymer and so on.[11]

> When the semiconductor chip 13 with the anisotropically conductive film 14 attached thereto is mounted, the connecting terminals 22 of the wiring pattern 21 on the mounting surface 20 of the anisotropically conductive film 14 are connected to the corresponding connecting pads 16 on the circuit board 15 through well-known connection means, such as solder balls 25.[12]

> The present invention relates to a method for forming a metallic "cap" over under bump metal used as a barrier in the fabrication of solder bumps employed in the flip-chip bonded integrated circuits.[13]

Second, none of the references teach a copper stud on each contact pad. To the extent that the Egawa reference and the Chow reference teach using copper on the contact pads, the teachings are for a thin layer of under bump metal layer not sufficiently thick to serve as a stud for the purpose of a flip chip without requiring a solder bump on the top of the copper films.

Not only do the cited references lack all the elements in claim 5, but also there is no evidence of motivation to combine the references to incorporate the missing elements in claim 5.

For the above reasons, applicants respectfully submit that claim 5 is patentably distinct over the Lo reference, the Egawa reference, and the Chow reference.

Claims 6 through 9 and 12 properly depend from claim 5. Because the amended claim 5 is not obvious over the references, applicants respectfully submit that its

[11] Lo et al., supra, paragraph [0027].
[12] Egawa, supra, col. 4, ll. 47 through 53.
[13] Chow et al., supra, col. 1, ll. 4 through 7.

dependent claims must not be obvious and therefore stand patentable over the references.

Applicants respectfully submit that all claims in this case are in condition for allowance. Entry of this amendment and favorable consideration of this application after further examination are respectfully requested.

Respectfully submitted,

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